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REPORT

A FAIRER FUNDING STREAM:

HOW REFORMING THE CLEAN WATER STATE REVOLVING FUND CAN EQUITABLY IMPROVE WATER INFRASTRUCTURE ACROSS THE COUNTRY



Athens Village Wastewater Treatment Plant, Athens, Greene County NY

AUTHORS:

Katy Hansen, EPIC

Becky Hammer, NRDC

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Executive Summary

All people deserve clean water infrastructure that provides safe sanitation, healthy waterways, and protection from flooding. The Clean Water State Revolving Fund (CWSRF) was established to achieve those goals by providing billions of dollars in federal funding for local wastewater and stormwater systems. Yet even this substantial resource falls short of meeting needs, which grow each day due to aging infrastructure, climate change, and population growth. Moreover, systems serving certain populations face disproportionate hurdles when trying to obtain funds from the state agencies that administer the CWSRF program, experts and advocates report.

Given the importance of these resources, it's critical that the CWSRF provide equitable access to financial assistance to all communities—no matter where they're located or who lives in them. However, systematic, quantitative information on the demographic characteristics of program beneficiaries has not been available to the public, making it difficult to assess whether the program is serving all communities equitably.

To better understand the distribution of CWSRF funding, we analyzed data on CWSRF assistance from 2011 to 2020 and assessed the correlation between municipal characteristics and the likelihood of receiving a CWSRF award. We found that municipalities with more water quality violations and lower median incomes are statistically more likely to receive assistance, indicating that the states administering the program are taking some steps to direct funding to communities that need subsidized help to address infrastructure problems. On the other hand, we also found that smaller municipalities and those with larger populations of color are statistically less likely to receive CWSRF assistance. These findings suggest that states' CWSRF policies may not provide all potential recipients with an even playing field.

Reforms to the CWSRF program at the state and federal levels can improve equitable access to clean water infrastructure funding. First, Congress should continue to increase investment in the program to ensure that adequate funding is available for communities in need. States



A high water sign on a closed road in Covington, Kentucky, across the Ohio river from Cincinnati, Ohio, on February 25, 2018.

should assign higher priority to projects in underserved communities, ensure that those projects qualify for the most favorable award terms, and distribute more funding in the form of grants or forgivable loans. And program administrators must be more proactive in promoting the availability of these critical funds, coordinating with other sources of infrastructure funding and providing hands-on assistance to help communities apply.

Introduction

From coast to coast, our wastewater and stormwater systems face tremendous financial challenges. A decade ago, the U.S. Environmental Protection Agency (EPA) estimated that we must invest at least \$271 billion in these systems—collectively known as “clean water infrastructure”—just to meet then-current environmental and health standards, a figure that is now outdated and almost certainly an underestimate.¹ Even with the substantial infusion of new funds provided in the Infrastructure Investment and Jobs Act of 2021 (IIJA), the need far outstrips available resources.²

Aging and insufficient infrastructure, changing precipitation patterns, population growth in some areas and depopulation in others, and increasing regulatory requirements have caused construction and maintenance needs to skyrocket.³ Wastewater treatment plants are overwhelmed, stormwater facilities cannot handle the vast quantities of runoff generated by sprawling development, and communities ravaged by white flight and disinvestment struggle to update their infrastructure to meet existing demand.⁴ As a result, sewage spills into waterways, pollution degrades ecosystems, and rainwater floods streets and homes across the country. The American Society of Civil Engineers gave the nation’s wastewater infrastructure a D+ rating, and its stormwater infrastructure a D, in its 2021 infrastructure report card.⁵

While these infrastructure challenges are widespread, they affect certain communities more severely than others. From the Black Belt of Alabama to Metro East, Illinois, from remote Alaskan villages to the colonias of the Southwest, socioeconomically vulnerable people across the country live without access to properly functioning sanitation.⁶ Systemic racism and disinvestment have given rise to these inequities, and conventional approaches to paying for infrastructure—which rely on local sources of revenue to fund investments—have deepened them along racial and economic lines.⁷ For example, in many cities, historically redlined neighborhoods are exposed to a higher risk of urban flooding than other areas.⁸ This outcome is antithetical to the goal of protecting all communities from pollution and flooding.

Within this context, it is critical that federal programs to finance infrastructure distribute resources equitably, ensuring that all communities have a fair shot at receiving assistance and targeting the areas of greatest need. In fact, the EPA has identified equitable investment in disadvantaged areas as a key priority of federal water infrastructure spending.⁹ Yet when it comes to the nation’s largest dedicated source of federal loans and grants for wastewater and stormwater infrastructure—the Clean Water State Revolving Fund (CWSRF)—no nationwide

quantitative analysis has ever been conducted to assess whether the program is meeting those objectives.

National-level data published by the EPA do not identify the characteristics of the communities that receive funding through the CWSRF.¹⁰ And the only government-produced analysis of CWSRF allocations, a 2006 report by the U.S. Government Accountability Office, omitted all demographic indicators except population size and predated substantial program policy changes that affect how funding is distributed.¹¹ Some research on other aspects of the program includes population size as a control but does not assess other demographic characteristics.¹²

At the same time, studies of other federal funding programs have reached concerning conclusions about equitable access. A statistical analysis of the Construction Grants Program, a precursor to the CWSRF, concluded that small, low-income, and non-white counties were less likely than others to receive federal grants to construct wastewater infrastructure.¹³ Scholars have found that Federal Emergency Management Agency disaster aid programs deepen wealth and social inequalities.¹⁴ The U.S. Department of Housing and Urban Development determined that Texas’s distribution of federal hurricane relief funds discriminated on the basis of race and national origin.¹⁵ An analysis of the Drinking Water State Revolving Fund, a program parallel to the CWSRF that supports drinking water infrastructure projects, found that small and racially diverse communities are less likely than others to receive federal assistance.¹⁶

Anecdotal evidence suggests that similar patterns of unequal access and inequitable distribution exist within the CWSRF program. Experts and advocates report that small, low-resource communities face difficulties in obtaining CWSRF funding. The EPA stated in a recent strategic plan that “[l]ow-income, people of color, Tribal, smaller, and rural communities are disproportionately impacted by water related challenges and face historical hurdles in accessing water infrastructure funding.”¹⁷ According to the Congressional Research Service, “Many of these communities have limited financial, technical, and legal resources and may encounter difficulties in qualifying for and repaying CWSRF loans.”¹⁸

This report quantitatively assesses these observed inequities by examining a decade of CWSRF funding decisions and finds that smaller municipalities and municipalities with larger populations of color are statistically less likely to receive CWSRF assistance. On the basis of these results, we propose targeted policy reforms to make the program more equitable and accessible to all communities.

Background and Overview of the CWSRF

Several federal programs provide financial assistance for local wastewater and stormwater infrastructure, including the U.S. Department of Agriculture’s rural Water and Waste Disposal Loan and Grant program, the Department of Housing and Urban Development’s Community Development Block Grant program, and the EPA’s Water Infrastructure Finance and Innovation Act program.¹⁹ However, the largest dedicated source of public funding for wastewater and stormwater systems is the Clean Water State Revolving Fund, which has provided \$153 billion in total assistance for wastewater and stormwater infrastructure projects since the late 1980s.²⁰

HISTORY OF THE CWSRF

When the Clean Water Act was adopted in 1972, Congress established a federal grant program to provide resources for the construction of wastewater treatment plants or the upgrading of facilities to come into compliance with the law’s new requirements.²¹ Over the following decade and a half, the Construction Grants Program provided more than \$60 billion directly to municipalities for clean water infrastructure.²²

However, with anti-federal-spending sentiment on the rise during the Reagan era, Congress decided to phase out the Construction Grants Program in 1987.²³ In its place, Congress established the Clean Water State Revolving Fund. This represented a major shift in how the United States finances wastewater and stormwater infrastructure. The state-administered CWSRF program primarily provides loans to eligible borrowers (with the exception

of states’ post-2009 authority to provide “additional subsidization,” discussed below). Recipients of federally subsidized CWSRF loans benefit from below-market interest rates, which can result in significant cost savings compared with loans from private lenders.²⁴ States may also provide loan guarantees and refinancing of local debt obligations through the program.²⁵

Ultimately, however, the shift from grants to loans came with an important downside for many potential applicants: the costs of infrastructure improvements now fall on localities rather than the federal government.²⁶ Communities must pay back CWSRF loans using revenue from sources such as water and sewer bills or municipal taxes. As a result, the financial resources of a community—and the households within it—affect that community’s ability to access infrastructure funding through the program.²⁷

HOW THE CWSRF WORKS

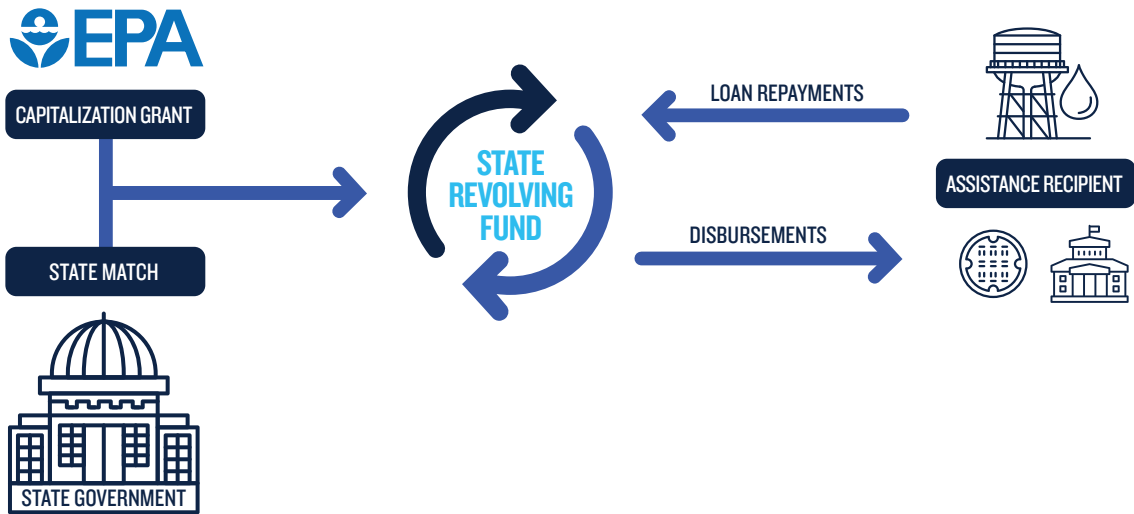
Each year, Congress appropriates funds for the CWSRF program. These appropriations are divided among the 50 states and Puerto Rico according to a preset allotment formula.²⁸ Each state places its portion of the money, known as the annual federal “capitalization grant,” into its CWSRF fund, along with a required 20 percent state match.²⁹ The state then uses this fund to provide financial assistance for wastewater and stormwater projects. Leverage bonds, investment earnings, and loan repayments are also deposited into the fund on a rolling basis, as depicted in Figure 1.

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Aerial view of a wastewater treatment facility.

FIGURE 1: THE STATE REVOLVING FUND PROCESS



These state funds are designed to “revolve.” That is, as loans are repaid, the money can be re-loaned to new recipients. However, beginning in 2009, Congress gave states the option of using up to 30 percent of their annual capitalization grant as “additional subsidization”—in the form of grants, principal forgiveness, and negative-interest loans—for certain eligible recipients and projects.³⁰ Funding provided as additional subsidization does not need to be repaid and therefore does not revolve back into the state’s fund. Until 2021, there was no statutory requirement for states to provide additional subsidization, but annual appropriations bills directed states to use a minimum percentage (typically 10 percent) of that year’s capitalization grant for this purpose.³¹ In 2021 the IIJA permanently codified a requirement that at least 10 percent, and up to 30 percent, of the federal capitalization grant be provided as additional subsidization, to the extent that a state receives sufficient applications from subsidy-eligible recipients in a given year.³²

Federal law has established broad, basic criteria for eligible CWSRF projects and applicants.³³ The program can provide assistance to construct or upgrade wastewater treatment facilities, install decentralized household sanitation systems, repair sewer pipes, manage stormwater runoff, recycle wastewater, implement nonpoint source pollution and water conservation programs, and make other improvements. Eligible recipients include municipalities, utilities, and other units of government, along with farmers, nonprofit organizations, private citizens, and businesses.³⁴

Within these general guidelines, states retain significant latitude to implement their programs as they see fit. EPA regulations require only that each state prepare an annual Intended Use Plan describing its criteria and methods for selecting projects and distributing funds, along with a yearly Project Priority List, listing the order in which project applications will receive funding.³⁵ As a result of this broad discretion, state programs vary in terms of the types of projects and applicants they prioritize, the interest rates and other loan terms they offer, the amount of additional subsidization they provide, and the extent and quality of technical assistance they give potential applicants.

PUBLICLY AVAILABLE DATA ON TYPES OF CWSRF PROJECTS AND ASSISTANCE

There are some publicly available national-level data on the CWSRF program, broadly illustrating the amount of funding flowing through the CWSRF and the types of projects it supports.

The EPA collects data annually from each state’s CWSRF program to account for the use of federal funds. The agency aggregates this information and publishes it in the CWSRF National Information Management System (NIMS). According to NIMS, the CWSRF made 15,386 awards providing \$62.5 billion in total assistance from 2011 to 2020.³⁶ Of this total, \$7.3 billion, or around 12 percent, was provided as assistance to disadvantaged areas that states classified as “hardship communities.”³⁷

About one-fifth of CWSRF assistance dollars went to small communities (population below 10,000), and about one-third went to midsize communities (population between 10,000 and 99,999).³⁸ Almost half of CWSRF assistance dollars went to communities with populations of 100,000 or more, although only 29 percent of the U.S. population lives in such communities.³⁹

While states can finance a wide variety of projects with CWSRF resources, most assistance—more than 90 percent—was used for centralized municipal wastewater treatment projects such as treatment upgrades, collection system repairs, and combined sewer overflow correction (Figure 2). Stormwater, conservation, nonpoint source, and other projects accounted for the remainder.⁴⁰

From 2011 to 2020, states distributed only \$2.6 billion, or about 4 percent of total assistance, as additional subsidization (Table 1).⁴¹ This equates to roughly 17 percent of federal capitalization grants over that period, well below the 30 percent cap.⁴² Of the total subsidization amount, \$2.25 billion was provided as principal forgiveness and \$349 million as grants.⁴³ As discussed in greater detail

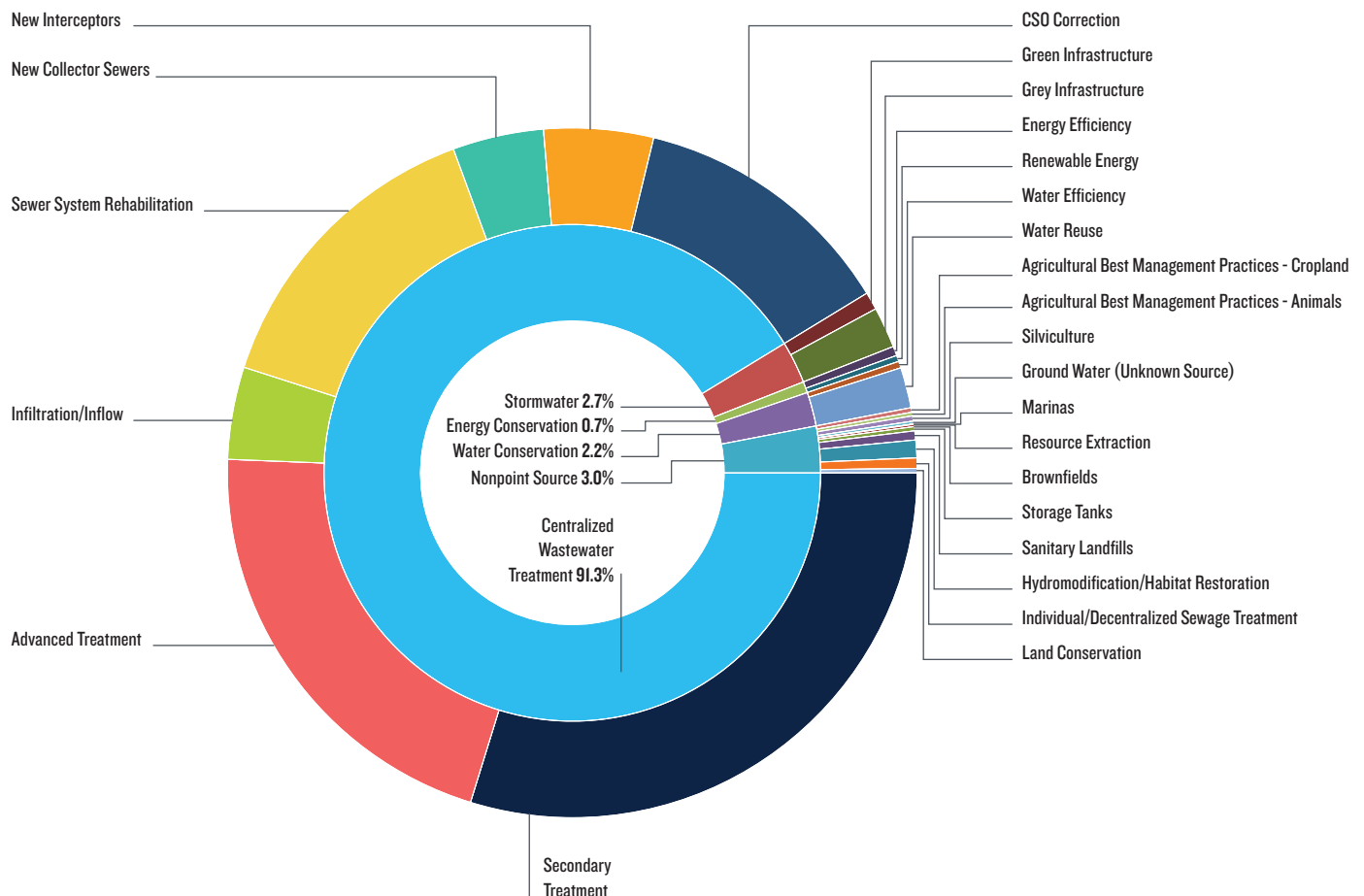
below, municipalities with fewer resources struggle to repay loans and depend on additional subsidization to invest in infrastructure.

| Type of assistance | Amount provided | Percentage of total |
|--------------------------------|-----------------|---------------------|
| Loans | \$59.9 billion | 95.8% |
| Additional subsidization | \$2.6 billion | 4.2% |
| • <i>Principal forgiveness</i> | \$2.25 billion | 3.6% |
| • <i>Grants</i> | \$0.35 billion | 0.6% |

(Data source: NIMS)

While this publicly available, national-level data on the CWSRF program provides important context, it doesn't tell the whole story. The original analysis presented in the next section fills existing data gaps by drawing on more granular project-level information to identify demographic trends in the distribution of CWSRF resources.

FIGURE 2: TYPES OF PROJECTS FINANCED VIA CWSRF, 2011–2020 (DATA SOURCE: NIMS)



Project-Level Analysis: Lower-Income, Larger, and Whiter Municipalities Disproportionately Benefit From CWSRF Assistance

From 2011 to 2020, 5.53 percent of all U.S. municipalities received a CWSRF award. However, not all kinds of municipalities were equally likely to receive assistance.⁴⁴ Our analysis shows that lower-income municipalities, those with more water-quality violations, more populous municipalities, and those with larger white populations were more likely to receive CWSRF funding. These results seem to demonstrate that some high-need municipalities are receiving funds, but that equal access has not been fully achieved.

However, it is important to understand the limitations of this analysis. Our approach does not take into account the number or size of the CWSRF award(s) that each municipality received, the amount of financial assistance distributed per capita, or regional cost-of-living differences, all of which can have significant implications for distributional equity. It also does not consider other funding sources for clean water infrastructure that may be available to the kinds of municipalities that are less likely to receive CWSRF awards. Finally, our municipal-level analysis also cannot identify potential funding inequities within particular municipalities or utility service areas. These factors merit further study.

METHODS AND DATA

We used a probit statistical regression model to assess the correlation between municipal characteristics and the likelihood of receiving a CWSRF award. This approach yields insights on which types of municipalities received an award—measured as a binary yes/no indicator—but not the amount or terms of an award. Appendix A describes our methodology in more detail.

We compiled data from several sources to assess the allocation of CWSRF awards. Because the publicly available NIMS data described above do not include information on individual CWSRF awards, we used fine-grained data from the Clean Water Benefits Reporting (CBR) system, which we acquired directly from EPA staff. CBR data are compiled by the EPA from quarterly project-level reports submitted by state agencies.

We assessed four municipal characteristics—history of water-quality violations, median household income (MHI), population, and the proportion of residents who identify as non-Hispanic white—to determine whether they correlated with the likelihood of receiving a CWSRF award. To identify municipalities' history of violating the water pollution limits of their wastewater permits, we geo- and name-matched municipalities to publicly owned treatment works (POTW) permit data from the EPA's Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES). We summed the number of self-reported violations per municipality between 2011 and 2020 and then created an ordinal variable with four categories: zero violations, 1–10 violations, 11–99 violations, and 100 or more violations to include in the probit model.⁴⁵ Appendix B explains the data in more detail.

We combined census data from the 2014–2018 American Community Survey, reported by place or county subdivision, to determine total population, MHI, and race/ethnicity characteristics of each municipality.⁴⁶ The descriptive statistics for our key variables are reported in Table 2 in Appendix B.

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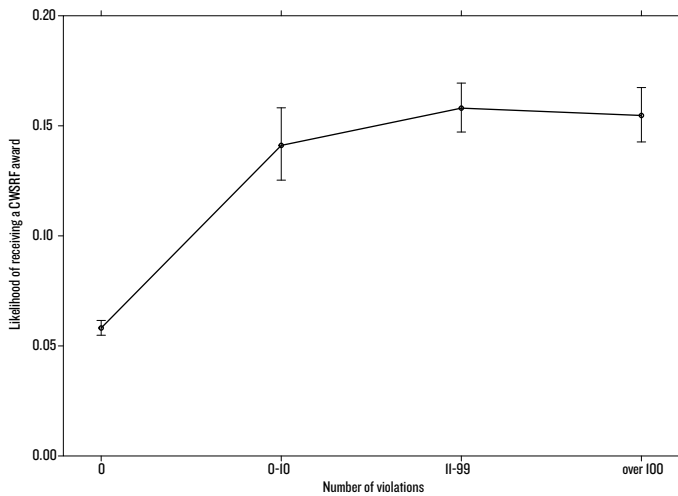
A home with a failing septic system resulting in a surface pool of sewage in Hayneville, Lowndes County, Alabama, on August 1, 2022.

WATER QUALITY VIOLATIONS

Municipalities with more self-reported wastewater permit discharge violations in the past decade had a higher likelihood of receiving CWSRF assistance (Figure 3). Moving from zero to 1–10 violations increased the likelihood of receiving a CWSRF award by 8.7 percentage points on average, holding all other variables at their means. Municipalities with more than 10 water-quality violations were even more likely to receive CWSRF assistance.

This result is consistent with the CWSRF program’s goal of directing resources toward wastewater systems that need help coming into compliance with the Clean Water Act and reducing the discharge of pollution into waterways. Indeed, studies have shown that wastewater treatment facilities receiving CWSRF awards improve the quality of their effluent discharges more than facilities that do not receive loans.⁴⁷

FIGURE 3: RELATIONSHIP BETWEEN EFFLUENT VIOLATIONS AND LIKELIHOOD OF RECEIVING CWSRF ASSISTANCE, 2011–2020. BARS SHOW 95 PERCENT CONFIDENCE INTERVALS

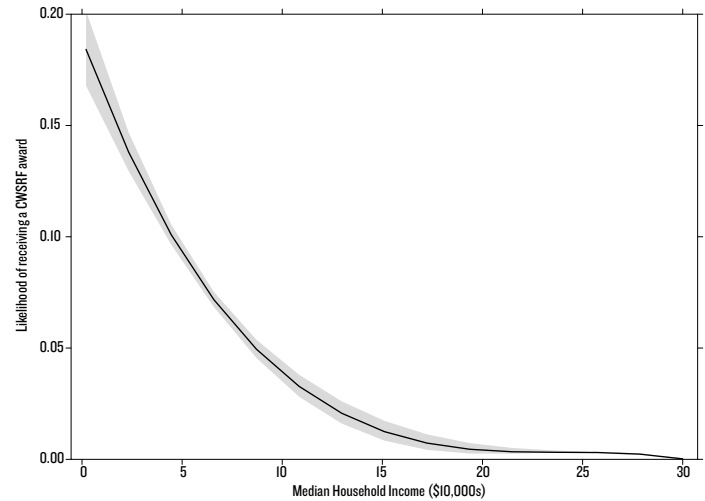


MEDIAN HOUSEHOLD INCOME

Municipalities with lower median household incomes were more likely to receive a CWSRF award (Figure 4). An additional \$10,000 in median household income from the average was associated with a 1.45-percentage-point lower likelihood of receiving assistance, holding all other variables at their means.

This finding is consistent with the CWSRF program’s goal of providing federally subsidized assistance to communities with limited capacity to finance infrastructure with capital from other sources.⁴⁸ However, it does not indicate whether the program is adequately meeting the significant needs of lower-income municipalities.

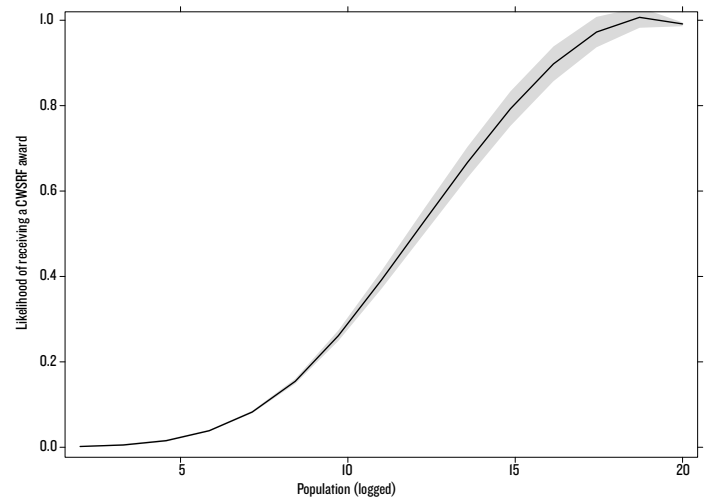
FIGURE 4: RELATIONSHIP BETWEEN MHI AND LIKELIHOOD OF RECEIVING CWSRF ASSISTANCE (DARK GRAY LINE) WITH 95 PERCENT CONFIDENCE INTERVALS (LIGHT GRAY AREA), 2011–2020



POPULATION

Municipalities with larger populations have a greater likelihood of receiving CWSRF assistance (Figure 5). While small municipalities often need federal financial support due to limited local funds, they may face hurdles accessing that assistance due to a lack of capacity and technical resources. Large communities’ higher chances of receiving an award indicate that state CWSRF programs are not adequately helping small communities surmount those obstacles.

FIGURE 5: RELATIONSHIP BETWEEN POPULATION SIZE AND LIKELIHOOD OF RECEIVING CWSRF ASSISTANCE (DARK GRAY LINE) WITH 95 PERCENT CONFIDENCE INTERVALS (LIGHT GRAY AREA), 2011–2020

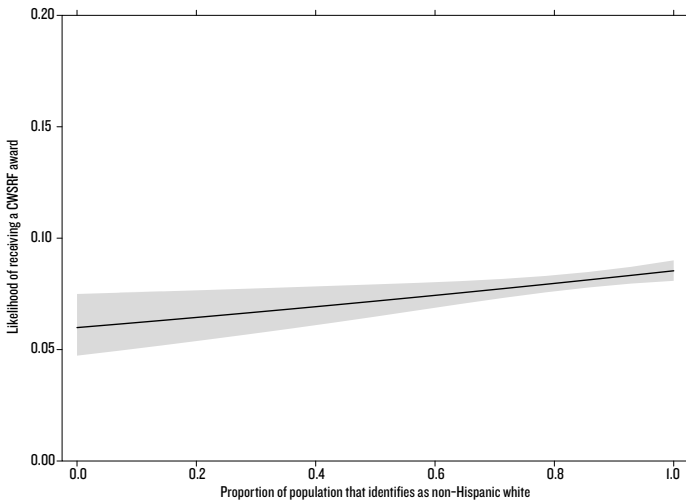


RACE/ETHNICITY

Communities of color often bear the greatest burden of inequitable access to clean water infrastructure and have the most severe need for CWSRF resources. However, our analysis found that municipalities with larger white populations were more likely to receive CWSRF assistance (Figure 6). An increase of 10 percent in the proportion of residents that identify as non-Hispanic white was associated with a 0.31-percentage-point increase in the likelihood of receiving an award, holding all other variables at their means.

While the magnitude of this discrepancy is relatively small, it is nonetheless concerning given the importance of distributional equity to the goals of the CWSRF program, and given the range of other barriers—such as disproportionate environmental, socioeconomic, or health burdens—making it more difficult for communities of color to complete infrastructure improvements.⁴⁹

FIGURE 6: RELATIONSHIP BETWEEN RACE/ETHNICITY AND LIKELIHOOD OF RECEIVING CWSRF ASSISTANCE (DARK GRAY LINE) WITH 95 PERCENT CONFIDENCE INTERVALS (LIGHT GRAY AREA), 2011–2020



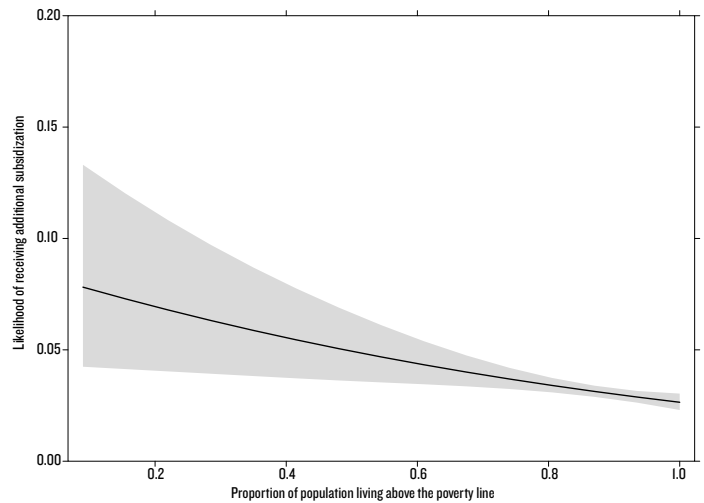
ADDITIONAL SUBSIDIZATION

We reran our analysis to examine the characteristics of the subset of municipalities that received additional subsidization (grants or principal forgiveness) as part of their CWSRF assistance package. The results largely mirror those reported above, with one exception: our analysis shows no statistically significant correlation between the likelihood of receiving additional subsidization and the proportion of residents that identify as non-Hispanic white (see Table 3 in Appendix D).

We then examined the proportion of the population living above the poverty line as an additional consideration. Poverty rates are an imperfect but credible measure of residents' ability to pay for infrastructure improvements through fees and taxes. Communities with high rates of poverty tend to need enhanced financial support in the form of grants and principal forgiveness in order to upgrade infrastructure without burdening their most vulnerable residents.

Indeed, we found that additional subsidization was more likely to reach municipalities with higher rates of poverty (Figure 7). A 10 percent decrease in the proportion of residents living above the poverty line from the average was associated with a 0.56-percentage-point increase in the likelihood of receiving additional subsidization, holding all other variables at their means.⁵⁰

FIGURE 7: RELATIONSHIP BETWEEN POVERTY AND LIKELIHOOD OF RECEIVING CWSRF ADDITIONAL SUBSIDIZATION (DARK GRAY LINE) WITH 95 PERCENT CONFIDENCE INTERVALS (LIGHT GRAY AREA), 2011–2020



Policy Recommendations

The results of our analysis indicate that state CWSRF programs are directing federally subsidized assistance to communities with more water quality violations and to lower-income municipalities, but they are disproportionately failing to reach small and nonwhite communities.

These results raise concerns about fairness within the CWSRF program, and the racial disparity implicates the states' obligations to comply with Title VI of the Civil Rights Act.⁵¹ Title VI's prohibition against racial discrimination in federally funded programs applies not only to intentional acts but also to procedures, criteria, or methods of administration that may appear neutral but have a racially discriminatory effect.⁵² Our analysis suggests that states may need to update their CWSRF policies to ensure that people of all racial and ethnic backgrounds have equitable access to this important source of funding.

We recommend the following policy reforms to reduce inequity in CWSRF funding distribution and direct more assistance to communities that have been underserved by the program.⁵³

INCREASE OVERALL CWSRF FUNDING

Even with the infusion of new resources in the IIJA, wastewater and stormwater infrastructure needs vastly exceed the available funds.⁵⁴ Investing more money into the CWSRF would help enhance states' ability to meet the needs of all communities, including those that have been excluded from funding in the past.⁵⁵ Congress should build upon the accomplishments of the IIJA by continuing to increase appropriations for the program, with the goal of ultimately providing \$10 billion in federal funding for the CWSRF each year.

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Urban Swim event, Hudson River.

ASSIGN HIGHER PRIORITY TO PROJECTS IN UNDERSERVED COMMUNITIES

States' methodology for prioritizing project applications is critically important when funding demand outstrips availability. Under current program rules, states retain significant discretion to adopt their own project ranking criteria.⁵⁶ While they commonly include factors such as environmental benefits, utility service improvements, resiliency, sustainability, and project readiness in their ranking criteria, many do not consider the demographic characteristics or the financial capacity of the project applicant.

States should update their project prioritization and ranking systems to give greater weight to projects benefiting communities that are currently underserved by the CWSRF, as the EPA recently recommended in a memorandum to state CWSRF managers.⁵⁷ In addition to considering the economic characteristics of communities, our analysis suggests that states may also need to incorporate other demographic factors that track population size and race. Given that the statistical likelihood of receiving a CWSRF award increases when a community is lower-income but decreases when a community has a larger population of color, using income as a stand-alone proxy for race does not seem to be effective at correcting racial disparities in funding access. These results are consistent with previous findings that, while income and race are correlated, proxy indicators can be insufficient to consistently identify areas affected by discrimination and divestment in communities of color.⁵⁸

States should also consider how prioritization criteria that are not demographic in nature affect the kinds of communities whose projects receive funding priority. For example, if a state prioritizes CWSRF applications from systems facing Clean Water Act enforcement actions but declines to bring enforcement actions against disadvantaged communities with failing systems, this prioritization metric could make it harder for underserved areas to access badly needed funds.⁵⁹ State agencies should avoid considering non-demographic factors in ways that work against resources reaching the most underserved communities.

For all prioritization factors, states should consider using a sliding-scale ranking system rather than a flat threshold, so that communities on the far end of the scale receive bonus points. For example, projects serving extremely low-income communities or those with very large populations of color would receive more weight than projects serving communities scoring more moderately on those metrics.

DISTRIBUTE MORE FUNDING IN THE FORM OF ADDITIONAL SUBSIDIZATION

While our results indicate that lower-income communities are statistically more likely to receive CWSRF awards, this finding does not mean that the program is fully meeting the needs of all low-income communities or that those communities face no obstacles to accessing CWSRF assistance. Many underserved communities lack the resources to take out and repay traditional CWSRF loans. Such communities may have the means to implement needed infrastructure projects only if they receive additional subsidization—i.e., grants and principal forgiveness, types of CWSRF assistance that do not need to be repaid.

States should make more CWSRF assistance available in the form of additional subsidization to accommodate the needs of communities that cannot afford loans. As discussed above, the EPA's CWSRF database shows that only a tiny fraction—4 percent—of total assistance from 2011 to 2020 was provided as additional subsidization, which equates to 17 percent of federal capitalization grants over that period.⁶⁰ However, the Clean Water Act allows states to provide up to 30 percent of each year's federal CWSRF capitalization grant as additional subsidization, meaning that states have been underutilizing this authority.⁶¹

States should distribute as much funding in the form of additional subsidization as possible under federal authority, and the EPA should encourage this practice in guidance. Meanwhile, Congress should increase both the minimum and maximum bounds on the amount of additional subsidization states are required to provide. While distributing a higher proportion of CWSRF funds as additional subsidization reduces the proportion of assistance revolving back into the fund for future use via loan repayments, this effect can be offset by increasing the overall amount of funding for the program, as recommended above.

ENSURE THAT ADDITIONAL SUBSIDIZATION POLICIES INCLUDE AND PRIORITIZE UNDERSERVED APPLICANTS

As states provide more funding in the form of additional subsidization, they should also reform their policies to better target that funding to applicants that need grants or principal forgiveness in order to participate in the program. This means reforming two interacting policies: a state's affordability criteria and its rules controlling how much additional subsidization any individual project or applicant may receive.

(1) Affordability criteria

The Clean Water Act authorizes a state to provide additional subsidization under three circumstances: when a recipient meets the state’s “affordability criteria,” when doing so is necessary to avoid significant hardship to ratepayers, or when the proposed project falls into one of four environmentally beneficial categories.⁶² As a result, a state’s affordability criteria are an important determinant of eligibility for grants and principal forgiveness.

Under the Clean Water Act, affordability criteria shall “assist in identifying municipalities that would experience a significant hardship raising the revenue necessary to finance a project” and “shall be based on income and unemployment data, population trends, and other data determined relevant by the State, including whether the project or activity is to be carried out in an economically distressed area.”⁶³ However, states have significant discretion to decide which “other data” are “determined relevant” as well as to prescribe the weight that must be given to the listed criteria. EPA guidance also allows states to focus on a subset of these criteria to the exclusion of others.⁶⁴

This lack of regulatory guardrails can have unintended consequences.⁶⁵ If not tailored appropriately, a state’s affordability criteria may exclude communities that need additional subsidization to access CWSRF funds while unnecessarily providing subsidized assistance to communities that could afford a traditional loan. For example, affordability criteria that include population thresholds but do not consider financial capacity, policies that provide a small amount of additional subsidization to all CWSRF recipients regardless of need, and policies that restrict additional subsidization to projects in the four “environmentally beneficial” categories may lead to ineffective and inequitable distribution of additional subsidization.⁶⁶

States should update their affordability criteria to ensure that underserved communities are eligible and prioritized for additional subsidization. The EPA should issue updated guidance encouraging them to do so and providing tools, such as model criteria, to increase consistency across states.

Affordability criteria should not be based on a single metric, such as population size or median income, but should incorporate a range of weighted indicators that relate to both the financial capacity of the community as a whole and the cost burden for low-income households that would result from rate increases to cover debt service on a loan.⁶⁷ The criteria should include poverty rates—a metric that many states do not currently consider—which can identify communities facing the greatest risk to affordability and sanitation access.⁶⁸ Criteria should also consider factors beyond typical economic metrics that may affect a community’s need for additional subsidization; for

example, disproportionate environmental, socioeconomic and/or health burdens may deplete a community’s ability to afford long-term investments. Because of systemic racism and racist policies such as redlining, race may be a relevant noneconomic indicator to include.

Given that there is often not enough additional subsidization to go around, states should establish tiers or gradations within their affordability criteria (rather than a binary definition) and take relative need into account, giving communities with the most severe economic need first priority for this assistance.⁶⁹

Note that a state’s affordability criteria do not have to match the metrics used in the project prioritization system discussed above, but the two sets of policies are interrelated. Eligibility for additional subsidization will not benefit a community if its project application ranks low on the state’s priority list; conversely, a community with a highly ranked project might not be able to afford the assistance if it does not qualify for subsidization.

Critically, states should develop and revise their affordability criteria in close consultation with stakeholders such as environmental justice groups, community members, Tribes, local governments, and nongovernmental organizations, especially organizations rooted in communities that have encountered obstacles to accessing CWSRF funds.⁷⁰

(2) Caps on additional subsidization

States should not only rethink their affordability criteria, but also avoid one-size-fits-all limitations on the amount of additional subsidization an applicant can receive. Caps on additional subsidization, either as a percentage of a CWSRF award or a dollar limit, can disadvantage communities that lack the resources to cover the loan portion of an award.⁷¹ States should assess how such caps affect the ability of potential applicants to access CWSRF funding and then, based on the results of that assessment, raise or eliminate the caps for financially distressed and underserved communities.

The trade-off of eliminating caps is that additional subsidization will potentially be concentrated among fewer communities. However, these are more likely to be the communities that need subsidized funding the most and would not be able to participate in the program or implement needed infrastructure projects without it.

OFFER FAVORABLE LOAN TERMS TO UNDERSERVED APPLICANTS

States should offer favorable loan terms such as lower interest rates and extended payment periods to underserved communities when additional subsidization does not cover all project costs. They should also allow

recipients to flexibly restructure their debt and to defer loan repayment until after project construction is completed.⁷² Many projects result in lower operating expenses that offset debt service costs, but if a community must start repaying a loan immediately, before the new facility is operational, a cash flow problem may arise.

ACTIVELY SOLICIT APPLICATIONS FROM UNDERSERVED COMMUNITIES

Robust public engagement and community outreach are essential in developing intended use plans and project priority lists. Yet many states take a passive approach to the CWSRF process, accepting applications from communities that choose to seek funding without proactively reaching out to other potential applicants.

This process disadvantages communities that are unaware of the program or do not understand the potential benefits of seeking funding, a category that often includes communities underserved by the CWSRF. A passive approach yields a disproportionate number of applications from well-resourced communities, a group that does not necessarily correlate with those having the greatest water-quality, financial, and public-health needs.

States should take a more proactive approach by marketing the CWSRF and conducting outreach to communities that are underrepresented in the program. States should recognize that community members themselves are often experts in their water systems and those systems'

shortcomings, and state CWSRF managers should ensure that this expertise is centered and supported in outreach to identify system issues and solutions. The EPA, in its oversight role, should require states to demonstrate that they have completed robust outreach and community engagement in order to be considered in compliance with additional subsidization rules and civil rights obligations. The agency's regional offices should also consider collecting and disseminating information about project solicitations and public input opportunities within their territories.

PROVIDE TARGETED TECHNICAL ASSISTANCE TO HELP UNDERSERVED COMMUNITIES ACCESS FUNDING

While utilities serving larger and wealthier communities employ in-house engineers or possess sufficient resources to hire outside consultants to prepare funding applications, many smaller and lower-income communities do not have the financial or technical capacity to apply for funding. The EPA should ramp up its technical assistance efforts through its regional offices, states should increase their own services (directly or through third parties such as NGOs or consultants) and take full advantage of CWSRF set-asides that can fund those activities, and Congress should deliver more technical assistance funding through annual program appropriations. One important goal of these efforts should be to increase the number of assistance providers available to help potential applicants.

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A stormwater-capturing rain garden filled with flowers, New York City.

Technical assistance should include not only general educational materials such as instruction manuals and webinars, but also hands-on, individualized help with project development and application materials. States should streamline the CWSRF application process as much as possible (for example, by adopting a rolling acceptance policy and allowing applicants to submit materials online), provide grants to cover the planning and design costs that are often obstacles to low-resource applicants, and help communities collect and report data that inform infrastructure needs assessments.

Technical assistance should cover every phase of the process: assessing problems, building internal capacity, gathering community input, planning and designing projects, and receiving and managing awards. It should also include helping applicants access other sources of funding if needed to supplement CWSRF resources or to comply with matching requirements.

USE CWSRF RESOURCES TO IMPROVE WATER AND SEWER AFFORDABILITY

Repaying a CWSRF loan often requires a community to raise residents' water and sewer rates. However, those rate hikes are less likely to be a burden in communities that begin the process with affordable water and sewer services. As a result, communities that take steps to ensure water and sewer affordability are in a better position to access CWSRF assistance.

In addition to providing water and sewer bill assistance themselves, states and the EPA should offer support and incentives for utilities to adopt affordability policies such as income-based water and sewer rates, customer rate assistance, water efficiency programs, and water shutoff protections.⁷³ In particular, states should revise their

policies if necessary to allow and encourage communities to use CWSRF funds to adopt affordability measures and then provide those that take these steps with favorable loan terms and project prioritization bonus points.

IMPROVE TRANSPARENCY ABOUT FUNDED PROJECTS AND RECIPIENT DEMOGRAPHICS

States can be held accountable for improving equity in the CWSRF program only if data are publicly available to measure their progress. Existing public data on the CWSRF focus on the financial health of the revolving funds themselves, rather than the outcomes of the assistance they provide. National project-level data are not easily accessible; for purposes of our analysis, we could obtain the necessary information only by contacting EPA staff directly. This lack of transparency makes it difficult to understand who is benefiting from funded projects, to ensure compliance with the Civil Rights Act and nonbinding targets like the Biden administration's Justice40 Initiative, and to identify further necessary reforms to the CWSRF program.⁷⁴

The EPA should publish CWSRF project data in a nationwide database that is searchable by state, county, and census tract. Each award should be geo-coded with latitude and longitude data that identify the location of the funded infrastructure or activity—information that is currently often missing or inaccurate. Wastewater and stormwater utilities receiving CWSRF funds should be required to provide GIS maps of their service areas to the EPA, the states, and the public to facilitate demographic analysis. Finally, the states should annually report detailed project selection criteria along with statewide demographic information on CWSRF funding distribution, including an assessment of how the state's policies are affecting distributional equity.

Conclusion

Every community in America deserves high-quality water infrastructure that provides safe sanitation, healthy waterways, and protection from flooding. That vision, however, will likely remain out of reach until every community has a fair and equitable shot at receiving financial assistance through the nation's largest clean water infrastructure program, the Clean Water State Revolving Fund. Unfortunately, a decade's worth of CWSRF awards across the country show that some communities have a fairer shot than others.

State governments responsible for implementing the CWSRF program are appropriately targeting funds to lower-income areas and systems with more water quality violations. But our analysis shows that smaller communities and municipalities with larger populations of color are statistically less likely to receive CWSRF

assistance. The people in these communities are often the most vulnerable to economic and environmental harm—exactly the people who shouldn't face an uphill battle to get help.

Unnecessarily restrictive and poorly tailored policies have created barriers to program participation that may be responsible for disparities in access to funds. The good news is that those policies can—and should—be fixed. Targeted reforms can make the CWSRF more effective and equitable, expanding resources to places that have been shut out for too long. From the amount of funding provided, to the methods of prioritizing projects and distributing grants, to the effort invested in community outreach and capacity building, new approaches can better direct assistance to those who need it most. With community-led advocacy and political will, the CWSRF can bring us closer to the vision of clean water for all.

Appendix A: Methodology

This report analyzes the relationship between water quality violations, demographic characteristics, and the likelihood of receiving a CWSRF award.

USE OF MUNICIPALITIES AS THE UNIVERSE AND UNIT OF ANALYSIS

Municipalities and utilities serving one or more municipalities receive the vast majority of CWSRF funding; therefore we limit our universe of potential CWSRF recipients to municipalities. We include both municipalities that already have publicly owned treatment works (POTWs, also known as wastewater treatment plants) and those that do not. We include municipalities without POTWs because they apply for and receive CWSRF funds to construct new facilities and implement other water quality control projects.

Ideally, our analysis would include all borrowers that are eligible to apply for CWSRF assistance—i.e., municipalities; counties; intermunicipal, interstate, and state agencies; nonprofit groups; private entities; and Tribes.⁷⁵ However, the data on non-municipal entities are insufficient and sometimes inaccurate. Some states and regions maintain partial lists of intermunicipal, interstate, and state agencies, nonprofits, and private entities, but these data are not available nationwide. Further, when individuals, businesses, and statewide bodies receive a CWSRF award, it is typically not possible to identify the geographic area affected by the infrastructure investment. Without an associated census polygon of the geographic area of service, it is not possible to associate the demographic data available at finer scales (e.g., census block, block group, and tract levels) with award outcomes to characterize who benefits from a CWSRF award.

As for states, counties, and Tribes, these recipients present too broad a unit of analysis. There can be multiple wastewater systems in a single county or Tribal community. Additionally, county demographic features such as race and income do not necessarily represent the demographic features of the population that a particular wastewater utility serves. That said, infrastructure needs are significant in Tribal communities, and distribution of funding to such communities is an area that warrants further study.⁷⁶

Note that because we exclude counties, our final data set of recipients does not include any CWSRF awards in Hawaii, where the only units of local government are counties and consolidated city-counties.

USE OF CROSS-SECTIONAL STUDY

Although municipalities apply for and states provide awards annually, we collapse the CWSRF award data from 2011–2020 to single observations for each municipality in the United States. A municipality is considered a recipient if it ever received a CWSRF award at any point (or any number of points) over the 10-year period. This period was chosen because it excludes large, one-time increases in funding that are not reflective of typical program years, like those included in the American Recovery and Reinvestment Act of 2009 or the Infrastructure Investment and Jobs Act of 2021.

Collapsing the panel data is appropriate because there is redundancy in awards from year to year. Utilities may amend and resubmit applications for the same project in multiple years. And states may list municipalities as recipients across several years, such as when it takes a few years for the paperwork to clear before an award is issued, or when capital is disbursed in phases. Our aim is to assess how municipal characteristics (in this case, race, median household income, and poverty level) correlate with a municipality's receipt of assistance at any time during the sample period, not the average or the total number of times it was funded. Cross-sectional studies are common in research on federal assistance programs.⁷⁷

PROBIT MODEL

We use probit models to estimate how demographic and water quality measures correlate with CWSRF assistance. The dichotomous dependent variable is whether a municipality received CWSRF funding. We leverage variation in water quality, demographic characteristics, and awards across municipalities. These estimates indicate correlations between municipal characteristics and CWSRF assistance but do not provide causal evidence.

The allocation of CWSRF funds depends on clean water infrastructure needs. Since the primary aim of the CWSRF program is to improve water quality and increase compliance with the Clean Water Act, violations of water quality limits in Clean Water Act discharge permits are a proxy to control for the condition of the community's infrastructure and correlate with community demographics.⁷⁸

We control for the total population (logged) in the municipality and water quality violations. Previous research indicates that population likely correlates with federal financial assistance: larger populations benefit from economies of scale, spread the high fixed costs of capital projects over more ratepayers, and borrow capital at lower interest rates. More populous places are also likely to have more technically trained staff to apply for assistance and manage projects. We cannot include the number of technically trained staff as a control because these data are not widely available, but total population is a decent proxy.⁷⁹ The population data, reported by place or county subdivision, are from the 2014–2018 American Community Survey.

We estimate a probit statistical model with the following form for receiving a CWSRF award:

$$R_i = \alpha + \beta_1 V_i + \beta_2 I_i + \beta_3 P_i + \beta_4 W_i + \beta_5 S_i$$

where R_i represents receipt of an CWSRF award for a given municipality i , V represents the violations category, I represents median household income, P represents population (logged), W represents the white population, S is a vector of state fixed effects, and α is the constant term.

We include state fixed effects to control for institutional design, implementation, and political differences that influence CWSRF allocation as well as the number of municipalities in the sample. We clustered the standard errors at the state level.

Appendix B: Data

MUNICIPALITIES

We include all municipalities in the United States (excluding territories) in our universe.⁸⁰ Municipalities are referred to with different names—e.g., cities, towns, villages, and townships—but we collectively refer to these as *municipalities*.⁸¹ State constitutions define the structure of municipalities, which vary across the country. States report municipalities to the U.S. Census Bureau as incorporated places and some minor civil divisions, also known as county subdivisions. Not all minor civil divisions are municipalities. We use data from the Census Bureau’s 2020 Place and 2020 County Subdivision Gazetteer files on local government units to determine which municipalities to include in our universe.⁸²

Wastewater districts also provide functions in local government. In our analysis, we aggregate data from the multiple municipalities that are served by wastewater districts into one observation.

CWSRF AWARDS

Data on CWSRF awards are from the Clean Water Benefits Reporting (CBR) database. This EPA-maintained database includes project-level information on awards that states report quarterly. We obtained the CBR data set of 2011–2020 awards directly from staff at the EPA Office of Water. We include data on the state, borrower, initial loan date, total assistance amount, percent funded by CWSRF, grant amount, principal forgiveness amount, latitude, longitude, and NPDES permit number, when provided. Due to variation in how states enter the data, not every award has an associated latitude, longitude, and NPDES permit number.

WATER QUALITY DATA

Information about NPDES permits, along with self-reported data on violations of those permits, comes from the EPA’s Enforcement and Compliance History Online (ECHO) database.⁸³ Specifically, this information is collected in an ECHO data set called Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES), through which the EPA tracks permit compliance.⁸⁴

Effluent violations involving a discharge of pollution that exceeds permit limits are known as “E90” violations. A complete list of municipalities’ E90 violations was downloaded from ICIS-NPDES. These are more serious than schedule or reporting violations and make for better indicators of systems in need of upgrades or repairs. We measure water quality violations as an ordinal variable based on E90 effluent violations of Clean Water Act discharge permits during the period. We use the sum to create an ordinal variable with four categories: zero violations, 1–10 violations, 11–99 violations, and 100 or more.

DEMOGRAPHIC DATA

The demographic data on total population, MHI, and race/ethnicity are from the 2014–2018 American Community Survey.⁸⁵

DESCRIPTIVE STATISTICS

TABLE 2: SUMMARY STATISTICS FOR MUNICIPAL COMMUNITY CHARACTERISTICS

| Variable | Mean | Median | Standard deviation | Min. | Max. |
|--|----------|----------|--------------------|----------|-----------|
| Number of violations | 55 | 0 | 291 | 0 | 23,955 |
| Population | 9,203 | 1,035 | 107,307 | 0 | 8,443,713 |
| MHI | \$60,000 | \$53,750 | \$24,698 | \$11,905 | \$250,000 |
| Race/ethnicity (% of population that identifies as non-Hispanic white) | 72.9 | 93.3 | 25.9 | 0 | 100 |

FIGURE B: DISTRIBUTIONS OF MUNICIPAL CHARACTERISTICS

FIGURE B 1.1: DISTRIBUTION OF # OF VIOLATIONS (<1,000)

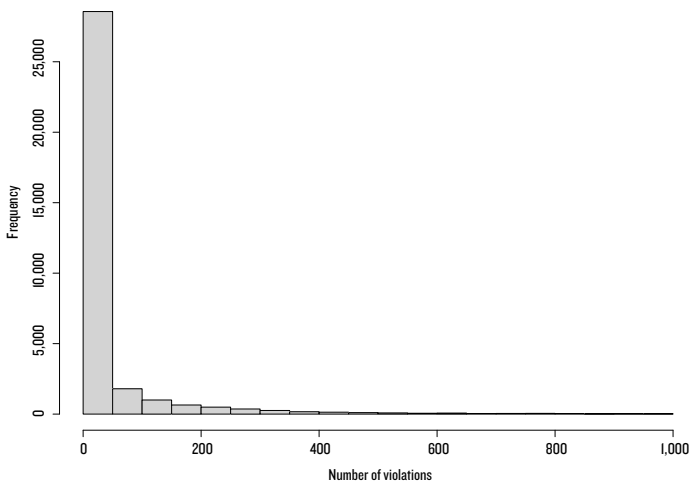


FIGURE B 1.2: DISTRIBUTION OF TOTAL POPULATION (<10,000)

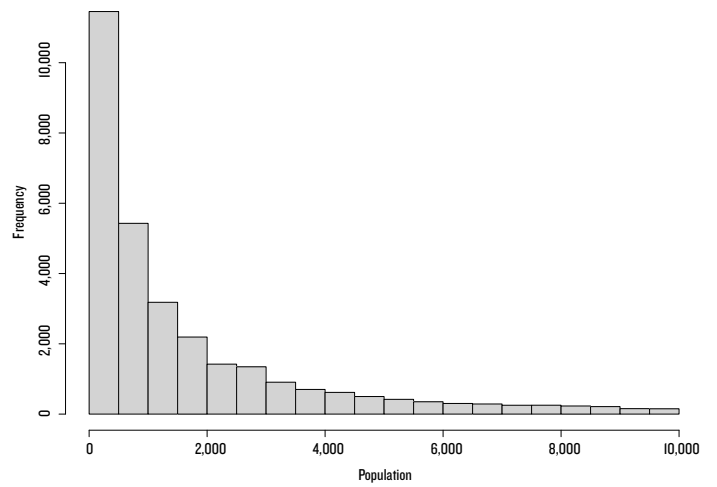


FIGURE B 1.3: DISTRIBUTION OF MHI (<\$150,000)

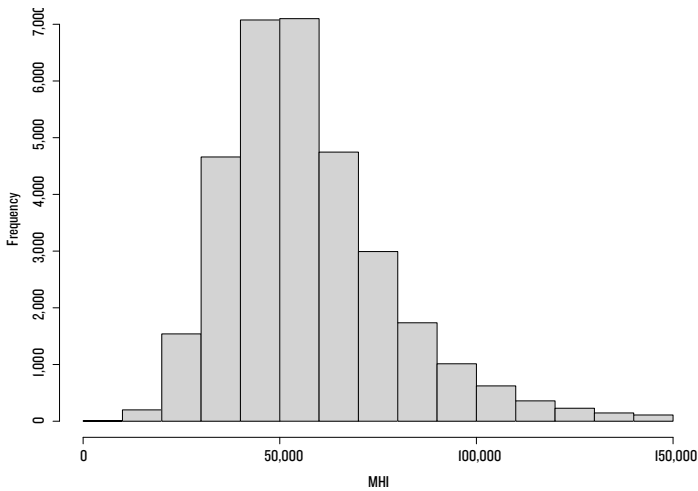


FIGURE B 1.4: DISTRIBUTION OF PERCENTAGE WHITE

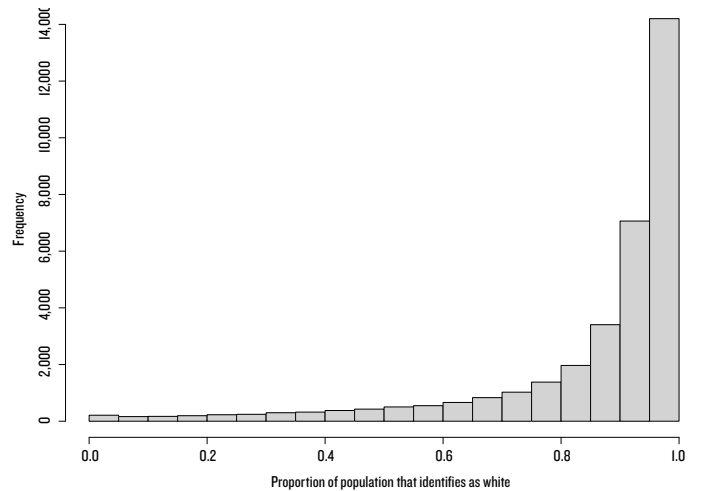
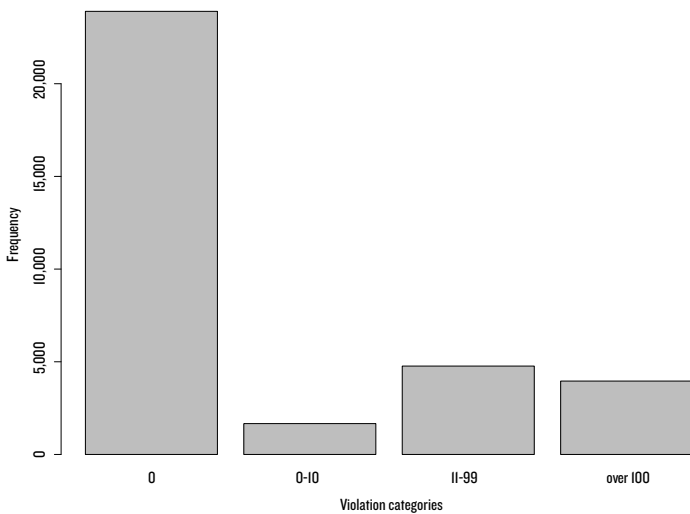


FIGURE B 2: DISTRIBUTION OF VIOLATION CATEGORIES



Appendix C: Crosswalks to Connect Data Sets

We needed to match CWSRF awards, water quality, and demographic data for districts and authorities to municipalities in order to conduct our analyses. We created a crosswalk to link CBR data with our universe of municipalities from U.S. Census data, and then another to link this universe of municipalities with NPDES permit and facility data.

CROSSWALK CWSRF AWARDS TO MUNICIPALITIES

The CBR data set includes 5,334 unique CWSRF recipients. Based on the name of the borrower and state where the borrower is located, we name-matched 4,520 of them to a municipality. The remainder (814) were hand-checked. Most (568) were utilities with names that were different from the name of the municipality served. We manually matched these utilities to the municipalities that they serve using publicly available information (e.g., list of communities served on a utility's website). The remainder (246) were removed, either because they fell into a category we excluded from the analysis (rural area; private business; individual; statewide entity; tribe; located in Puerto Rico) or because we lacked sufficient information to match them to a specific place.

CROSSWALK NPDES PERMITS TO MUNICIPALITIES

NPDES facilities and permitting data were joined together using NPDES identification numbers and external permit numbers. We included only facilities with facility type indicator POTW (publicly owned treatment works) and facility type codes MWD, CTG, DIS, and MXO, which indicate municipal, utility, district, or mixed ownership of the facility. Each facility has an associated longitude and latitude that was combined to a single point. For permits, we included those that were active based on permit status code.

We matched the coordinates of the geographic point from the NPDES facility data to the nearest census polygon from the Census Bureau's 2020 Place and 2020 County Subdivision Gazetteer files on local government units. We ensured that each match was correct by checking these identifiers: the EPA-designated location of the permitted facility, the name of the permitted facility, and the name of the geo-matched census place. We considered the match accurate if there was complete accord among all three identifiers, or if *either* the EPA-designated location of the facility *or* the name of the facility aligned with the geo-matched census place. However, if the geo-matched census place corresponded to neither the EPA-designated location of the facility nor the name of the facility, then the census place identified using the geographic coordinates was considered incorrect. In this last case, census places needed to be name-matched to permitted facilities using the state and place name of the facility's EPA-designated location.

Appendix D: Results

TABLE 3: PROBIT REGRESSION RESULTS PREDICTING ALL CWSRF AWARDS AND AWARDS WITH ADDITIONAL SUBSIDIES, 2011–2020

| | Recipient | | | | | |
|--------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | All (1) | All (2) | All (3) | Add. sub. (4) | Add. sub. (5) | Add. sub. (6) |
| I-10 violations | 0.50*** (0.04) | 0.54*** (0.04) | 0.49*** (0.04) | 0.43*** (0.05) | 0.48*** (0.05) | 0.43*** (0.05) |
| II-99 violations | 0.57*** (0.03) | 0.61*** (0.03) | 0.57*** (0.03) | 0.51*** (0.04) | 0.56*** (0.03) | 0.50*** (0.04) |
| More than 100 violations | 0.55*** (0.03) | 0.60*** (0.03) | 0.55*** (0.03) | 0.53*** (0.04) | 0.58*** (0.04) | 0.52*** (0.04) |
| MHI | -0.09*** (0.01) | | -0.08*** (0.01) | -0.12*** (0.01) | | -0.11*** (0.01) |
| Total population (log) | 0.29*** (0.01) | 0.28*** (0.01) | 0.29*** (0.01) | 0.23*** (0.01) | 0.20*** (0.01) | 0.23*** (0.01) |
| White | 0.19*** (0.07) | 0.16** (0.07) | 0.21*** (0.07) | -0.002 (0.08) | -0.02 (0.08) | 0.07 (0.09) |
| Above poverty | | -1.21*** (0.12) | -0.19 (0.16) | | -1.69*** (0.14) | -0.57*** (0.20) |
| Constant | -2.79*** (0.16) | -2.20*** (0.17) | -2.67*** (0.19) | -2.38*** (0.19) | -1.57*** (0.20) | -2.04*** (0.22) |
| Observations | 32,819 | 34,202 | 32,819 | 30,509 | 31,885 | 30,509 |
| Log Likelihood | -9,835.63 | -9,998.64 | -9,834.94 | -5,627.23 | -5,736.09 | -5,623.14 |
| Akaike Inf. Crit. | 19,781.27 | 20,107.28 | 19,781.87 | 11,364.46 | 11,582.18 | 11,358.27 |

Note: Estimated probit coefficients with standard errors in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01

ENDNOTES

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- 24 EPA, “Learn About the Clean Water State Revolving Fund (CWSRF),” accessed August 16, 2022, <https://www.epa.gov/cwsrf/learn-about-clean-water-state-revolving-fund-cwsrf>.
- 25 Ibid.
- 26 See Milwaukee Water Commons, “Testimony of Brenda Coley Before the House Committee on Transportation and Infrastructure’s Subcommittee on Water Resources and the Environment—Water Quality Protection and Job Creation Act of 2021,” February 2021, <https://transportation.house.gov/imo/media/doc/Coley%20Testimony.pdf>.
- 27 See Claudia Flores, “Metrics to Determine Principal Forgiveness Eligibility: Highlighting EPA Region 4,” University of North Carolina Environmental Finance Center, July 2018, <https://efc.web.unc.edu/2018/07/05/metrics-to-determine-principal-forgiveness-eligibility-highlighting-epa-region-4/> (“Many communities across the country still struggle to obtain this federal money, despite the borrowing incentives, due to capacity at the community level.”).
- 28 See EPA, *Review of the Allotment of the Clean Water State Revolving Fund (CWSRF): Report to Congress*, May 2016, https://www.epa.gov/sites/default/files/2016-05/documents/review_of_the_allotment_of_the_cwsrf_report.pdf. Rather than participating in the CWSRF revolving loan program, the District of Columbia and all U.S. territories other than Puerto Rico receive direct grant funding.

29 33 U.S.C. § 1382.

30 This authority was initially adopted via appropriations bills and was formally codified in 2014. 33 U.S.C. § 1383(i)(3).

31 See Consolidated Appropriations Act, 116th Cong. Division D, Title II, 330 (2021), <https://www.congress.gov/116/bills/hr133/BILLS-116hr133enr.pdf>.

32 IIJA, Pub. L. No. 117-58, § 50210(a)(1)(B) (codified at 33 U.S.C. § 1383(i)(3)(B)(i)(II)). This requirement applies to annually appropriated CWSRF funds. Separately, IIJA appropriates an additional \$11.713 billion to the CWSRF for use over the next five years, of which 49 percent must be distributed in the form of additional subsidization. Pub. L. No. 117-58, Title VI.

33 33 U.S.C. §§ 1296, 1383. See also EPA, *Overview of Clean Water State Revolving Fund Eligibilities*, May 2016, https://www.epa.gov/sites/default/files/2016-07/documents/overview_of_cwsrf_eligibilities_may_2016.pdf.

34 See EPA, *Financing Options for Nontraditional Eligibilities in the Clean Water State Revolving Fund Programs*, May 2017, https://www.epa.gov/sites/default/files/2017-05/documents/financing_options_for_nontraditional_eligibilities_final.pdf.

35 40 C.F.R. § 35.3150.

36 EPA, *Clean Water SRF Program Information: National Summary*, 15–16, line 109, and 19–20, line 128. NIMS data reporting years correspond to the federal fiscal year (July 1–June 30), so the “decade spanning from 2011 to 2020” is the period from July 1, 2010, to June 30, 2020.

37 *Ibid.*, 19–20, line 130.

38 *Ibid.*, 19–20, lines 118–120.

39 *Ibid.*, 19–20, line 121; United States Census Bureau, *Population Change for Incorporated Places With 2020 Census Populations of 50,000 or More in the United States: 2010 to 2020*, 2021, sum of column D, rows 4–325, <https://www.census.gov/content/dam/Census/newsroom/press-kits/2021/redistricting/places-population-2010-to-2020.xlsx>.

40 EPA, *Clean Water SRF Program Information: National Summary*, 23–24, lines 138–147, and 27–28, lines 151–166.

41 *Ibid.*, 65–66, line 324.

42 Federal capitalization grants to the CWSRF totaled \$15.45 billion from 2011 to 2020. *Ibid.*, 7–8, line 70.

43 *Ibid.*, 65–66, lines 321 and 323.

44 We considered all U.S. incorporated places and some minor civil divisions as the universe of potential CWSRF recipients. Municipalities—also referred to as *cities*, *towns*, *boroughs*, *villages*, and *townships* but collectively referred to as *municipalities* throughout this report—receive the vast majority of CWSRF funding. While counties, nonprofits, private entities, states, and Tribes are also eligible to receive CWSRF funds, they make up a small fraction of the awards in our subject data set and are less suited to fine-grained demographic analysis. Please see Appendix A and B for more details.

45 The categories defined by order of magnitude were set largely for ease of interpretation. The results are similar when violations are included as a continuous variable or different bin sizes.

46 U.S. Census Bureau, *American Community Survey*, <https://www.census.gov/data/developers/data-sets.html>.

47 Winston Harrington and Anna Malinovskaya, “Expected Versus Actual Outcomes of Environmental Policies: The Clean Water State Revolving Fund,” Resources for the Future, Discussion Paper 15-46, October 2015, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2677927.

48 It is possible that the negative correlation between median household income and the probability of receiving a CWSRF award reflects wealthier municipalities opting out of applying for CWSRF awards. Wealthier municipalities with strong tax bases and good credit are less likely to need federally subsidized financing.

49 See EPA, *DWSRF Disadvantaged Community Definitions: A Reference for States*, June 2022, 14, https://www.epa.gov/system/files/documents/2022-06/DWSRF%20DAC%20Definitions%20Report_June%202022.pdf (“Disadvantage also stems from structural inequality that tracks along racial, cultural, health, geographic, and other lines, and from the cumulative effects of many harms experienced by some communities. A combination of these characteristics can present more barriers for communities to achieve positive outcomes, like successfully completing water infrastructure improvements.”).

50 When we assessed the impact of poverty rate on the overall likelihood of receiving a CWSRF award, the results were not statistically significant. See results table in Appendix D.

51 42 U.S.C. § 2000d et seq.

52 EPA’s Title VI implementing regulations prohibit the use of “criteria or methods [in federal funding programs] which have the effect of subjecting individuals to discrimination because of their race . . . or have the effect of defeating or substantially impairing accomplishment of the objectives of the program or activity with respect to individuals of a particular race . . .” 40 C.F.R. § 7.35(b).

53 We do not address certain policy issues that are beyond the scope of the paper, such as recommendations for enhancing water infrastructure equity within a single community or service area (as opposed to distributional funding equity among recipients), or for improving equity within funding programs other than the CWSRF.

54 The CWSRF provided \$8.2 billion in total assistance during the most recent reporting year (ending June 30, 2021). The Infrastructure Investment and Jobs Act will provide an additional \$1.9–\$2.6 billion per year through 2026. By contrast, EPA’s 2012 Clean Watersheds Needs Survey found that America’s clean water infrastructure requires at least \$271 billion in investment in order to come into compliance with health and environmental standards. EPA, *Clean Water SRF Program Information: National Summary*, 24, line 136; EPA, *Clean Watershed Needs Survey 2012: Report to Congress*.

55 While outside the scope of this paper, it is also important to invest more resources into other federal clean water infrastructure funding programs—particularly those that low-income communities of color are likely to utilize.

56 See 40 C.F.R. § 35.3150.

57 “Priority points may need to be redistributed to ensure disadvantaged communities are receiving funding. For example, states should evaluate the weight associated with points given for different ranking criteria to determine whether they act as a barrier to, or encourage, funding for disadvantaged communities.” EPA, *Memorandum: Implementation of the Clean Water and Drinking Water State Revolving Fund Provisions of the Bipartisan Infrastructure Law*, 4.

58 See, e.g., Aditya Aladangady and Akila Forde, “Wealth Inequality and the Racial Wealth Gap,” *FEDS Notes*, Board of Governors of the Federal Reserve System, October 2021, <https://doi.org/10.17016/2380-7172.2861> (“In the United States, the average Black and Hispanic or Latino households earn about half as much as the average White household and own only about 15 to 20 percent as much net wealth.”). Studies have found that disparities in exposure to harmful pollution are more pronounced between racial groups than they are between socioeconomic groups. See, e.g., Ihab Mikati et al., “Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status,” *American Journal of Public Health* 108, no. 4 (April 2018): 480–85, <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297>.

59 Scholars have documented that state agencies are slower to inspect facilities for Clean Water Act violations in low-income communities and less likely to bring Clean Water Act enforcement actions in high-poverty counties. David Konisky, Christopher Reenock, and Shannon Conley, “Environmental Injustice in Clean Water Act Enforcement: Racial and Income Disparities in Inspection Time,” *Environmental Research Letters* 16, no. 8 (August 2021): 084020, <https://doi.org/10.1088/1748-9326/ac1225>; David Konisky, “Inequities in Enforcement? Environmental Justice and Government Performance,” *Journal of Policy Analysis and Management* 28, no. 1 (Winter 2009): 102–21, <https://www.jstor.org/stable/29738988>.

60 EPA, *Clean Water SRF Program Information: National Summary*, 7–8, line 70, and 65–66, line 324.

61 33 U.S.C. § 1383(i)(3). Note that the IIJA requires states to distribute 49 percent of its CWSRF funding as additional subsidization, but this mandate applies only to the law’s one-time infusion of supplemental funds, not to regularly appropriated annual funds. Pub. L. No. 117-58, Title VI.

62 33 U.S.C. § 1383(i)(1). The four environmentally beneficial categories are water efficiency, energy efficiency, stormwater mitigation, and sustainability. 33 U.S.C. § 1383(i)(1)(B).

63 33 U.S.C. § 1383(2)(A).

64 Andrew D. Sawyers, director, EPA Office of Wastewater Management, *Interpretive Guidance for Certain Amendments in the Water Resources Reform and Development Act to Titles I, II, V, and VI of the Federal Water Pollution Control Act*, memorandum to Waste Management Division Directors, January 2015, 18, https://www.epa.gov/sites/default/files/2015-04/documents/water_resources_reform_and_development_act_guidance.pdf.

65 See EPA, *DWSRF Disadvantaged Community Definitions*, 14 (“The variability in how states use common indicators can result in inconsistent access to assistance across the country.”).

66 EPA particularly urges states not to use population thresholds in determining eligibility for preferential funding. See *ibid.*, 6 (“Small communities do not always struggle with affordability, and some may be wealthy areas that can afford higher costs.”) and 23 (“For example, a definition that limits [additional subsidization eligibility] to water systems serving populations of 10,000 or less may exclude larger communities that meet other . . . criteria or that have subpopulations with significant financial or public health needs.”).

67 EPA has supported the use of eligibility tests for preferential funding that combine multiple criteria. *Ibid.*, 9 (“Composite indices may produce a more refined picture of the community and can be a valuable tool for objectively comparing communities based on multiple factors.”).

68 *Ibid.*, 5 (“The poverty rate may be the single best indicator of the presence of people who face severe financial hardship, and for whom even modest increases in rates would present a burden.”).

69 EPA recommends that states take this approach in the Drinking Water State Revolving Fund context. *Ibid.*, 9 (“Establishing different levels of criteria allows DWSRF programs to distinguish among degrees of hardship and direct a higher level of assistance to communities determined to have greater need.”).

70 See *ibid.*, 23 (“A core tenant [sic] of assisting disadvantaged or marginalized groups is to actively involve them. This is different than making draft [eligibility requirements] available for public comment prior to finalization, which often yields only minimal engagement from well-resourced entities. . . . States can benefit from using an intentionally inclusive process that encourages wide participation up front.”).

71 *Ibid.*, 21 (“A low cap may be particularly burdensome for [disadvantaged communities] facing financial hardship. For some water systems, taking on almost any level of new debt is infeasible.”).

72 EPA regulations allow CWSRF loan repayments to begin up to one year after project completion. 40 C.F.R. § 35.3120(a)(1)(ii).

73 For a comprehensive overview of state- and local-level policy solutions to improve water and sewer affordability, see Larry Levine et al., *Water Affordability Advocacy Toolkit*, NRDC and National Consumer Law Center, 2022, <https://www.nrdc.org/sites/default/files/water-affordability-toolkit-full-report.pdf>.

74 See Executive Order 14,008, Sec. 223, January 27, 2021, <https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad>.

75 See EPA, *Overview of Clean Water State Revolving Fund Eligibilities*.

76 See Heather Tanana et al., *Universal Access to Clean Water for Tribes in the Colorado River Basin*, Water & Tribes Initiative: Colorado River Basin, April 2021, <https://tribalcleanwater.org/wp-content/uploads/2021/09/WTI-Full-Report-4.20.pdf>.

77 Kenneth N. Bickers and Robert M. Stein, “Interlocal Cooperation and the Distribution of Federal Grant Awards,” *The Journal of Politics* 66, no. 3 (August 2004): 800–822, <https://doi.org/10.1111/j.1468-2508.2004.00277.x>; Brian K. Collins and Brian J. Gerber, “Redistributive Policy and Devolution: Is State Administration a Road Block (Grant) to Equitable Access to Federal Funds?” *Journal of Public Administration Research and Theory* 16, no. 4 (October 2006): 613–32, <https://doi.org/10.1093/jopart/muj010>.

78 Manuel P. Teodoro, Mellie Haider, and David Switzer, “U.S. Environmental Policy Implementation on Tribal Lands: Trust, Neglect, and Justice,” *Policy Studies Journal* 46, no. 1 (February 2018): 37–59, <https://doi.org/10.1111/psj.12187>.

79 Tyler A. Scott, Tima Moldogaziev, and Robert A. Greer, “Drink What You Can Pay For: Financing Infrastructure in a Fragmented Water System,” *Urban Studies* 55, no. 13 (October 2018): 2821–37, <https://doi.org/10.1177%2F0042098017729092>; Manuel P. Teodoro and David Switzer, “Drinking From the Talent Pool: A Resource Endowment Theory of Human Capital and Agency Performance,” *Public Administration Review* 76, no. 4 (July/August 2016): 564–75, <https://doi.org/10.1111/puar.12571>.

80 Note that our universe does not include any municipalities in Hawaii, where the only units of local government are county and consolidated city-county.

81 We also refer to *boroughs* as municipalities, except in Alaska, where the term designates a county-level unit of government.

82 U.S. Census Bureau, Population Division, “SUB-EST2019: Subcounty Resident Population Estimates: April 1, 2010 to July 1, 2019,” May 2020, <https://www2.census.gov/programs-surveys/popest/technical-documentation/file-layouts/2010-2019/sub-est2019.pdf>.

83 EPA, Enforcement and Compliance History Online, Data Downloads, ICIS-NPDES National Dataset (Part 2: Effluent Violations), data downloaded July 23, 2022, https://echo.epa.gov/files/echodownloads/npdes_eff_downloads.zip.

84 *Ibid.*

85 U.S. Census Bureau, *American Community Survey*.